

**CRYOMILLED ALUMINUM ALLOYS AND COMPONENTS EXTRUDED  
AND FORGED THEREFROM**

**ABSTRACT OF THE DISCLOSURE**

5           High strength aluminum alloy powders, extrusions, and forgings are provided  
in which the aluminum alloys exhibit high strength at atmospheric temperatures and  
maintain high strength and ductility at extremely low temperatures. The alloy is  
produced by blending about 89 atomic% to 99 atomic% aluminum, 1 atomic% to 11  
10   atomic% of a secondary metal selected from the group consisting of magnesium,  
lithium, silicon, titanium, zirconium, and combinations thereof, and up to about 10  
atomic% of a tertiary metal selected from the group consisting of Be, Ca, Sr, Ba, Ra,  
Sc, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, W, and  
combinations thereof. The alloy is produced by nanostructure material synthesis,  
such as cryomilling, in the absence of refractory dispersoids. The synthesized alloy is  
15   then canned, degassed, consolidated, extruded, and optionally forged into a solid  
metallic component. Grain size within the alloy is less than 0.5  $\mu\text{m}$ , and alloys with  
grain size less than 0.1  $\mu\text{m}$  may be produced.

20

CLT01/4631101v12

25